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THE MUSHROOM GROWERS'
ASSOCIATION

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7 JUL 1956

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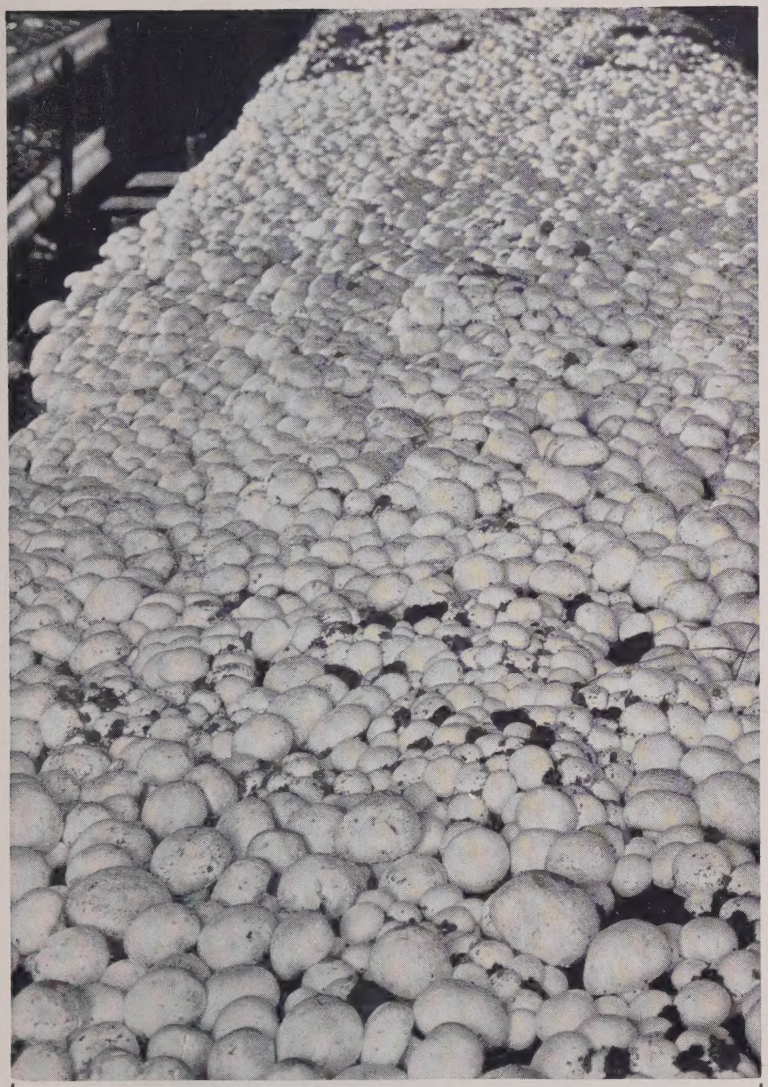

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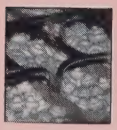

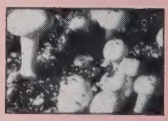

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The
MGA BULLETIN

JULY, 1956
NUMBER 79

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EDITORIAL

THIRD INTERNATIONAL CONFERENCE

The overall picture of the Third International Conference on the Scientific Aspects of Mushroom Growing, held in Paris last month, was one of success from start to finish.

In a gathering of this kind, where growers mingle with the scientists and where science and practice make an effort to get together, disappointments are inevitable. On the one hand the scientist is out to explain why this and that happens, whilst the grower, anxious and rightly so to improve production, accepts that these things do go on in the underworld of the compost and the casing soil and in the mushroom itself, but is more concerned with the practical aspects of the cure rather than the cause.

It may well be, as one delegate suggested, that it would be better if scientists alone had their own international conference but whilst, purely from an academic point of view, this might be advisable it is surely better for all concerned if occasions such as this were seized as an opportunity for the two sides to make close contact, personal rather than by the written word. In the field of mushroom growing, as in every other field, science and practice are equal partners. After all, if science was not put into practice there would be little use in science and, equally, if there were no mushroom scientists there would be few if any successful commercial mushroom growers. The two are interdependent.

There was, in Paris, some criticism of the general programme and some criticism of the quality of the papers in general, although there were some notable exceptions in this field. But what gathering, international or otherwise, escapes criticism? For that matter what real progress would be made without it?

But the overall Paris picture surely, was a good one with representatives of the various countries meeting, in the conference room, in and about the French caves and on the several social occasions.

Long then may these conferences of ours continue, for nothing but good can come out of such gatherings where the views of various countries are freely exchanged even though they may not always be so freely accepted.

W.R.A.

A general view of the composting yard at Chesswood Nurseries, Thakeham, with the peak heat buildings in the background. A fork lift tractor can be seen in the background and behind it, one of the giant turning machines is at work.

THE LINFIELD STORY

The farm walk which takes place on 11th July, at the mushroom farms of Messrs. A. G. Linfield Ltd., in Sussex, ranks as one of the most important events in the history of the MGA, for members will have the opportunity of inspecting at first-hand a gigantic undertaking which produces no less than between four and five million lb. of mushrooms each year.

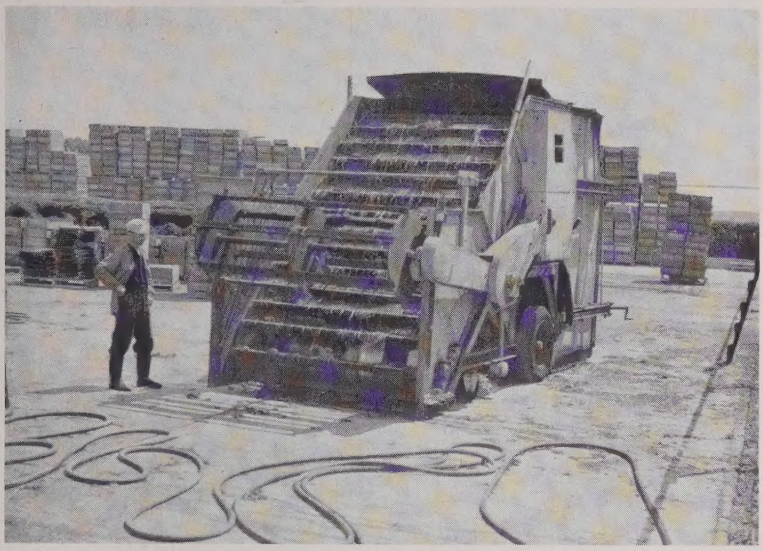
Somewhat staggering in conception, the Linfield farms represent the nearest possible approach to a mushroom producing factory, for every operation is geared to high level mechanisation and manual labour is reduced to a minimum.

Perhaps one of the first impressions which strike the visitor is the very obvious fact that the growing houses, in construction, are nothing elaborate and, indeed, the majority of such houses on the Chesswood Nurseries are, in fact, adapted greenhouses, whilst others are structures which bear the war time stamp of utility.

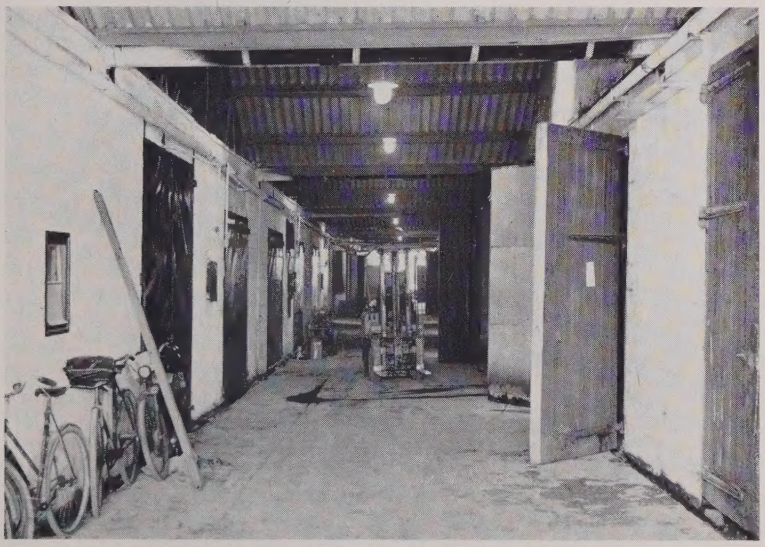
Whatever the outside picture conveys, that inside the buildings measures up to the highest standard of cleanliness and free air circulation with fans, air ducts, etc.

When I visited the plant, accompanied by the MGA Chairman, Mr. G. W. Baker, there was a fine show of mushrooms, but the Managing Director, Mr. Jim Linfield, member of the MGA Executive Committee, echoed the fears and the hopes of growers on a much smaller scale when he said, "I only hope there's plenty of mushrooms to show them on 11th July."

Messrs. A. G. Linfield were producing cultivated mushrooms as far back as 1882 and may well have been one of the earliest firms in the business. Certainly they rank with but one or two in this country who have been mushroom growers without a break for around 90 years. Present head of the firm, Mr. A. G. Linfield, is now in his late sixties



A front view of one of the composting machines. These machines, self feeding, can, with two men, turn 200 tons of compost in eight hours. Some idea of its size can be gauged by the man standing beside it.



The series of peak heat rooms with a self lift truck—a machine, one of several—which plays a vital part in the mechanisation on the Linfield nurseries.

and it was his father who founded the concern. Now Mr. Jim Linfield makes the third generation to specialise in growing mushrooms, although mushroom growing is by no means the extent of the firm's activities. Hundreds of thousands of roses, under glass, are produced every year. So too are carnations by the thousand, outdoor lettuce as well and, for good measure, no less than 5,000 bacon pigs are turned out each year and 20,000 turkeys, but that is another story. So too is the fact that Messrs. Linfield farm has no less than 800 acres of land!

To return to mushroom growing. The tray system, with trays measuring 3′ × 2′, is in operation and, at all stages prior to the actual stacking in the growing sheds, the trays in tiers of five or six, are handled by truck lifts and roller conveyors. The latter are of aluminium for lightness of moving from place to place.

Horse manure is still used as the basis of compost, although experiments are being carried out with other mediums. Two gigantic (no other word is adequate) mechanical composters, self-feeding, turn the compost at the rate of 200 tons in eight hours, with only two men to work the machine and take care of the stacking. Short composting on the Sinden two-phase method as described in Mushroom Science 2 is carried out in seven to eight days and the trays are then filled to a depth to allow, after firming, some four inches of compost. This tray filling is one of the few operations still carried out by hand, but a self-filling machine, awaiting modification, is already on the farm. " I firmly believe in cutting out the hard work as much as possible," said Mr. Linfield, as we stood in the vast concreted composting yard in the open air. The large yard, with its long heaps of compost in various stages, carries just one week's compost supply.

Mr. Jim Linfield, Managing Director of Messrs. A. G. Linfield Ltd., and a member of the MGA Executive Committee seen in one of the growing houses with the MGA Chairman, Mr. G. W. Baker.

The trays are then conveyed by lift-trucks to the pasteurising rooms each designed to contain 3,600 sq. ft., the unit to which the whole plant is geared. Pasteurisation takes from 5-7 days with a peak heat of 130 to 140 degrees F. A five man team with a special machine deals with the spawning—grain spawn is used throughout—and the trays, after passing through the machine run along a roller conveyer to the tamper. The spawn is run at a temperature of 75° F., cased with a mixture (equal parts volume) of peat and chalk and a growing temperature of around 60° F. follows. Picking commences from 28-30 days after spawning. Five crops are taken per year working on a ten week cycle.

In all, on the plants at Thakeham, Abingworth, Sompting and Ashington—the whole are supplied with compost from Thakeham—a staff of some 120 to 130 girls are maintained for picking alone, for the average daily pick is between 12,000 and 15,000 lb. Forty-five of the girls live in a country house, purchased and converted by Messrs. Linfield into a hostel. The total staff engaged on mushroom growing is about 200.

Visitors to the farm will, on 11th July, be entertained to buffet tea in the new canteen.

Looking back, one of the most vivid impressions created by the Linfield undertaking was the air of efficiency about the whole outfit, with everyone apparently busy. I recall too the huge oil furnaces for the oil fired thermostatically controlled heat, the workshops turning out the air cowling, the intake vents, etc., and the large machine shop dealing with tractors, combines, etc.

There wasn't time to have a look at the pigs, the 120 acres of fodder beet grown specifically for their use, or the thousands of turkeys in the course of rearing—that really is another story altogether.

I did however find time to ask Mr. Linfield about the MGA Publicity Scheme and this is what he said: "I think it is doing a fine job and a lot of good. I and the firm are only too pleased to pay our share."

WRA.

STANLEY MIDDLEBROOK'S

PINHEADS

106. I have an awful feeling, as I write, that I am the only mushroom grower left in England. All the best people have left for Paris and the International Conference. By the time this is published all you best people will have returned, so full of new ideas and super scientific certainties that you will have guaranteed crop failures for months to come. Meanwhile we lesser men who can ill afford the time for higher thought (not to mention higher Parisian living) plod on with our daily practice and our daily discoveries with an enforced contentment which we are pleased to imagine is remote from and independent of International discussion. In short, we are narrow-minded, deeply-rutted, and —er—jealous.

107. There has been a great deal of publicity lately, designed or accidental(?) for Irish mushrooms flown into the North of England. According to one write-up they are said to be better than English-grown mushrooms " because they are not so intensively cultivated." The same writer describes how, " after a curing period, mushroom spawn is introduced along with peat . . . . bedded in trays built into towering racks, sometimes at nine levels . . . . in three weeks pinheads appear . . . mushrooms are bursting out all over." Not intensive?

108. Atkins on page 176 of Bulletin 78 says Cecid larvae on the bed surface succumb in their thousands to Diazinon dust applied between flushes. This, he claims, de-harasses growers. I'll re-harass them by stating that Diazinon dust as supplied under one trade name certainly does not kill the large paedogeneticing Cecids. I believe I used the same dust from the same supplier as F.C.A. and my Cecids thrive on it.

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I can only suppose he was referring to the small (pupating?) larvae of the *Heteropeza* sp. I feel bound to report that despite the fact that Palfrey found five out of ten of the large larvae alive after 24 hours of rolling in a saucer of Gammexane, this insecticide is the best thing we have found yet for the pest. But it means repeated applications. If we stick to a routine of two doses per crop—one after spawning and one after casing (a process which served us well for several years)—we find we gradually get a build up, presumably because the pest has not been completely eradicated from the plant, but if Gammexane is applied whenever possible throughout the crop there seems to be a reduction in the dangerous population. By dangerous I mean the large larvae which climb up and damage the mushrooms; so far I have no evidence here that the small larvae—those so easily killable by Atkins—do any direct damage whatever.

109. My target for 1956 is to achieve 2 lb. per sq. ft. in a first flush. I've every reason to believe this is possible in the not too distant future—though perhaps it is too optimistic to expect it in 1956. We have, however, just had 1·4 in a first flush on a bottom (concrete) bed. This bed had a special treatment which, like so many tests, answered questions that were not asked. The control bed opposite did 0·7, or just half. The 1.4 bed was by no means white over with mushrooms: I would say there was ample room for another 0·6.

110. If there's ever any danger of our becoming big-headed we have only to think of our failure with peat as a casing. Since going on to this in January, 1953, we haven't had a 3 lb. crop; a position we hope shortly to remedy by various means not, I must admit, entirely connected with peat.

S.M.: Tell me, F.C.A., is this compost ready?

*F.C.A. (reading): "There should be a marked fall in the concentration of cellulose and xylan. Waksman, McGrath and Nissen attach great importance to used lignins which follow the assimilation of hemicelluloses, but Klioushnikova contradicts this. The parenchymatous cells of the straw will be attacked by the mycelium and we must know whether xyloses and hemicelluloses, which appear to be the substances of choice, are likely to be found in the compost . . . . . "**

S.M.: Yes, Yes . . . . . but is this compost ready or isn't it ?

*With apologies to Sarazin for extracts from his series, "The Cultivated Mushroom," deliberately taken out of context.

111. I would hazard a guess that up to this present moment over 95% of useful discoveries in mushroom growing have come from trial and error and not from research or scientific investigation. If this Bulletin is unearthed in 10 years' time I would point out that that first sentence was carefully worded: I emphasize " up to this present moment " and " discoveries in mushroom growing." One can't see into the future, but it may be that one day research will justify itself, in mushroom growing I mean. If it is to do this it must set itself a long-term programme and we should forget about it as a means of " getting useful results soon." That last is a quote from Edwards in the last Bulletin. As usual I find myself disagreeing with him. I see no point whatever in doing hot research on Phorids, Cecids and the like. Any help we get will come from trial and error or from accident. The trial and error may be done by insecticide manufacturers, experimental stations, growers, or what you will, and unless " research " means experiment and guesswork we may as well cut the word out of our vocabulary. Science told us all there was to be known about Sciarids and the early Phorid, but it couldn't find a killer by direct conclusion. It was left to trial and error to discover that DDT and Gammexane put an end to the problem as a serious one. I emphasized " discoveries in mushroom growing " because most of our problems seem to be solved by adapting what research has done in other fields than our own. Diazinon, if it *is* a Cecid-killer, was not evolved in the great Atkins' brain as a result of his intensive study of the shape and life cycle of the pest; it came right out of the blue and was adapted in a scheme of trial and error. I suggest we forget about short term *research* and think more about *experiments*. Pure research should look at the problem of compost in a long-term programme. Compost is the foundation of all our work and it's the thing about which we know least. It's good to know that *experimental* work is soon to be started in Yorkshire and Lancashire and presumably elsewhere on some of our immediate problems, though some little time must necessarily elapse before these stations acquire that confidence in mushroom growing which seems to be vitally important if experiments are to mean anything—perhaps, shall we say, 10 years? Older hands might put it at 20 years.

112. One must admire the fruit salesman who found himself landed with a big consignment of very old black-gilled mushrooms which were difficult to sell. In an inspired moment he thought up and erected the following notice: " Luscious dark-gilled mushrooms—guaranteed not to turn pink."

THIRD INTERNATIONAL CONFERENCE

With mushroom experts from over twenty countries gathering together under one roof on the occasion of the Third International Conference held in Paris from 14th to 23rd June, it was, perhaps, a little surprising that, whilst the delegates from the various countries expressed doubts and fears on the continuation of supplies of horse manure, little or no progress appears to have been made in the field of synthetic compost and the well-tried MRA (Yaxley) formula remains well ahead in this field.

What did emergewas the fact that every country is mainly concerned with the production of what might be termed the ordinary common type of cultivated mushroom, *Psalliota hortensis*. True, there were one or two papers which dealt with " other types of fungi " but appeared clear that, whilst there was no demand there was little point in devoting much attention to the matter. Nevertheless it was comforting to learn that a second line of defence was not being entirely neglected.

There was no doubt that this conference, attended by some 300 delegates, was a real success. It might be argued that the scientific papers, in the main, disclosed that little progress had been made in the striving towards greater production and the fight against disease. Rather can it be said that the work over the past year or two was that of consolidation rather than progress.

Be that as it may, this conference provided the opportunity for learning more and more about the methods of cultivation in the various countries, of the yields per foot or per ton of compost; of the hopes and fears of growers in the field of production and consumption and of the steps being taken everywhere in the field of publicity. Indeed, the news that a levy of 9d. per carton of spawn was imposed in Denmark for publicity purposes came as a real surprise and certainly shadowed the efforts which are being made in other countries in this matter—our own included.

Other highlights of the conference included a forthright paper by Mme. Randouin (France) Member of the Academy of Medicine and Director of the Institute of Scientific Hygiene, on the composition, food value and vitamin content of the mushroom and Mme. Randouin fully deserved the acclaim which was afterwards accorded her.

A group of MGA members who formed part of the United Kingdom delegation to the Third International Conference on Mushroom Growing. Left to right :—Fred. C. Atkins (Internal Committee Chairman), S. A. F. Sampson, G. W. Baker, (MGA Chairman), Raymond Thompson, Miss Shirley Baker, the MGA Secretary, and T. G. Figgis. This picture was taken at the opening ceremony of the French Federation's new experimental station at Montesson.

In all, the MGA party which attended numbered about fifty and was led by Mr. G. W. Baker, the MGA Chairman. Most unfortunately, at the opening session Mrs. Baker slipped heavily on some steps and injured her hip. She was taken to hospital where, fortunately, an X-ray examination revealed that no bones were broken although one was chipped. Very pluckily Mrs. Baker carried through with the complete programme aided, among other things, by willing hands and an invalid chair.

At the opening session the delegates were welcomed at the Agricultural Research Station at Versailles by M. Braconnier (Director) and speeches were made by M. Gillard, President of the Conference; by Mr. Fred. C. Atkins, Chairman of the Permanent International Committee, also by Herr Erich Hullen of Germany and Mr. G. W. Baker (United Kingdom).

It was at this session that Mr. Baker conferred on the noted French Mushroom Scientist, M. Sarazin, Life Membership of the MGA.

In the late afternoon (Thursday) following a prolonged but thoroughly enjoyable lunch, a visit was paid to the French Federation's new research station at Montesson where lashings of champagne added to the general air of well being. The visit proved of absorbing interest and M. Sarazin is to be congratulated on the work in progress.

On Friday the real business of the conference at the Natural History Museum began and was continued until the following Wednesday. Brief reviews of the position of the industry in many lands were given by Dr. Kark (South Africa), Messrs. Hullen (West Germany), Stockert (Austria), Rasmussen (Denmark), Roca Dumora (Spain), Guichon (France), Borzini (Italy), Pereira (Portugal), Stridsberg (Sweden), Kuhn (Switzerland) and Baker (United Kingdom).

It was at this stage that Mr. Baker, reviewing mushroom growing in the United Kingdom, referred to the loss of the Mushroom Research Association at Yaxley, now taken over by the Ministry. It appeared that the Ministry would be concerned only with pure research and Mr. Baker forecast that practical research might well have to be undertaken by the growers throughout the MGA.

An International flavour about this picture taken during the opening ceremony of the Conference at the National Agricultural Research Centre at Versailles. Left to right : Dr. P. J. Bels (Holland), C. Riber Rasmussen (Denmark) and Peter Flegg (United Kingdom).

Of the exciting tour in the Loirre Valley, with visits to the caves of M. Dezarnaulds at Bourré (trays-peak heating) and the more extensive outfit of M. Vrain at Dampierre (caves-ridge beds-no peak heating) with no less than 12 miles of ridge beds in production at any given time, more will be written later. On this delightful tour too there were those very fine lunches, particularly that in the courtyard of a farmhouse and adjoining the wine cellars—quite an unforgettable experience.

Of the man who went to sleep in the night club, with so much on view; of the two ladies who, in their best French asked for melon and received whiting and of the many other humorous sidelights, more anon.

Of the final banquet what more can be said than it was a fine do altogether, with Mr. Fred. Atkins (Internal Chairman) again discharging

Continued on page 236

From America comes . . .

STEMS AND PIECES

By **Joseph M. Michaels,** *Naperville, Illinois, U.S.A.*

5. Production records are sometimes very misleading. Especially are they misleading when a grower is given to boasting. Consider a local chap, and he is as honest as the day is long; but he told us yesterday that he picked 1·74 pounds per square foot in sixteen days picking. To-day he proudly showed us his picking records. Of course there were sixteen picking days. But he picked every other day and sometimes every third day.

6. And then there is a grower in another country who in effect folds his hands and says to the scientists, " Well here I am - and I dare you boys teach me something."

7. Have been looking at some 1,800 odd yards of manure delivered to another grower this week. As I look at these huge piles of bedding, I am asking myself, " How can there be so many constipated horses?"

8. A tremendous amount of enthusiasm is being displayed by the Chicago growers about the ' Mushroom Industry ' summer course* offered to mushroom growers by Pennsylvania State University. The programme for this course is most interesting, and the staff at Penn. State who will conduct the course are probably the best men in the field. I know that our British friends would like to know what opportunities are offered to American growers, so I would like to mention some of the programme and men. There is " Mushroom Diseases " by Dr. Kneebone, "Animal Pests of Mushrooms " by Dr. Thomas, " Disease Control " by T. T. Ayers and Kirby, " Building Markets," " Merchandising " and " Economics of Merchandising " by Drs. Lee, Bylund and John. There is the " Influence of the Casing Layer " by Dr. Schisler. Dr. Washko, Professor of Agronomy, will discuss soils.

Dr. Richer, Professor Soil Technology, will lecture on " Know your Soils."

There are field trips scheduled. These include " Hay Production for Synthetic Compost" and a visit to Chef-Boyardee Mushroom Plant. And if that isn't enough there are guest lecturers scheduled and a banquet with Speaker Dr. W. Henning, Secretary of Agriculture.

And what does it all cost? It is ten dollars it could only happen in America!

We are all looking forward to summer, and most growers will be the richer for it. There will be a few though who will not change one bit even after a summer course in mushroom culture. For those few it is like this: You can lead a boy to college, but you can't make him think. I was going to mention that well-known adage about leading a horse, but I have been halted by Pinhead 81. I cannot risk any more plagiarism.

9. Of course trays have some inherent disadvantages. But such gushy metaphors (Pinhead 71) trays could never have earned. Such

*Two MGA members, J. Stewart-Wood of Aylesbury and C. G. Griffiths of Congresbury (Som.), are attending this Conference.

a verbose catharsis could only be experienced by one who must have many systematized delusions about trays.

And how inefficient are trays really? Production records are a measure and a criterion of the efficiency of any system. It is reasonable to accept that about 75% to 80% of the total crop is picked in the first four weeks of picking. One large grower (shelf) picks 85% of the total crop in four weeks at a cropping temperature of 64° F. Mushrooms continue to grow in a desultory manner (they usually paddle along at 20% efficiency) till the house is emptied. Trays (not shelves) can be replaced immediately after efficient production has passed with new heavy cropping trays. Shelves have to be refilled, pasteurized, spawned, etc., and during all these weeks are producing zero pounds of mushrooms. It is interesting to note that in America, the largest growers, Butler County and Knaust are tray growers. Chef Boyardee also grow in trays, and they do not crop in caves like Butler and Knaust. So that this does not become a problem in semantics I would like to summarize: It is simply stated that roughly 80% of a total crop is picked in the first four weeks of cropping. I suggest that a system which can maintain suc hhigh efficiency production throughout most of the weeks in the year should be the system preferred. So it is the tray system that is to be commended.

10. Students of comparative anatomy and physiology tell that the anatomy and physiology of the alimentary canal of the rabbit more nearly resembles the alimentary canal of a horse than of any other animal. I am suggesting that perhaps rabbit droppings might make an excellent compost for mushroom growing.

the world's finest mushroom basket

Designed after consultations with growers, wholesalers and retailers, the Dring Mushroom basket embodies lightness, ease of stacking, rigidity and, above all, the wax impregnated board from which they are made *absolutely eliminates the possibility of the mushrooms being spoiled through the basket absorbing moisture.*

DON'T DELAY ORDER NOW!

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at the lowest cost of any basket in use today

Dringport Works, The Airport, Portsmouth, Hants

BASUDIN

F. C. WOOD

W. Darlington & Sons Ltd., Worthing

General Characteristics

Basudin is the trade name under which formulations of the chemical Diazinon—are marketed. Diazinon is a member of the phosphoric acid ester group and is thiophosphoric acid—2-isopropyl-4-methyl-pyrimidyl-(6) -diethylester. It was first tested out by the Geigy organisations at Basle, Switzerland, and was introduced as one of the best products for fly control. Moreover very extensive tests at Basle by the Geigy research team showed that products containing Diazinon are no more toxic than those containing a similar proportion of lindane. Even though Diazinon is a phosphorus compound therefore, there is no danger to the worker in its use provided the same commonsense precautions are carred out as when using any other insecticide such as nicotine, BHC, Malathion, etc., viz., inhalation of dusts and aerocides should be avoided by wearing a suitable respirator, smoking and eating should be avoided during operations, and the hands should be washed after working with the insecticide.

Basudin is offered in three formulations as follows:—

(1) 20% Aerosol.

(2) 2½% Dust.

(3) 20% Emulsifiable Solution.

Method of use of specific formulations

For rapid control of adult fly infestation the 20% Aerosol is the most effective formulation requiring the minimum quantities of active material applied with the minimum labour costs. The aerosol must of course be applied by using some form of compressor developing at least 30 lb. pressure per square inch. On large farms some form of paint spray compressor (such as the Ronco Compressor) gives very good results; on small farms or where small house units are in question the P.B.I. Aerocide Gun is effective, the only drawback being that more than one refill of the gun may be needed as each filling treats approximately 3,000 cubic feet of air space. Best results are achieved by leaving on the electric lights for an hour before fumigating, to activate the flies. The aerocide should be atomised down the main gangway of the house, starting at the far end away from the door, the operator walking backwards and liberating the insecticide at head height with the gun held level. The rate of progress should be timed so that atomisation is completed at the same time as the operator reaches the door or, in the case of the small P.B.I. gun where, say, three " shots " are needed, each one should take the operator down a third of the house. Distribution is improved by running an electric fan in the centre gangway

*"Quot Homines, Tot Sententiae"**—

and the Latin tag was never truer than when applied to mushroom growers and their methods of composting! From the ultra-short brigade, through the two-phase gentlemen to those who stick to traditional methods there is almost infinite variety in such matters as numbers of turns, period between turns, length of peak heat, temperature and so on. There are variations on a theme such as the triangle men, those who extol the virtues of the split lump, and more recently, the 'no-composting-at-all' school of thought. All these earnest seekers after truth pursue the same goal—more pounds of mushrooms per unit of imput.

It is a good thing that in such a divided world they have *one* factor upon which they can rely, no matter what method of composting they follow. Whether the medium is short or long, DARLINGTON'S 100% SPAWN will give consistently good results.

* "*There are as many opinions as there are men.*"

For Short or Long Composting

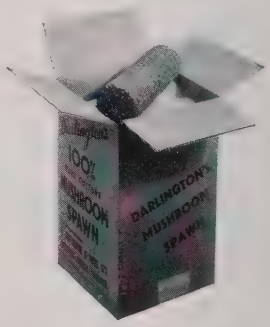
DARLINGTON'S
REGD.

100%

PRODUCTIVE PURE CULTURE

MUSHROOM SPAWN

Gives the best results



for 10 minutes after the house has been closed and atomisation completed. The rate of application of the 20% Basudin Aerosol is 1 fluid ounce per 3,000 cubic feet of air space.

The 20% Basudin Aerosol can be used at all stages but, as with all insecticides, if used during cropping, the beds should be picked hard before fumigation and watering should be deferred until *after* treatment. If brown spotting of the mushrooms is observed near the gangways it is due to one of two reasons:—

(*a*) The compressor pressure is too low, giving rise to large droplets instead of a true aerosol.

(*b*) The gangway is too narrow so that the aerosol is being discharged *directly on to the crop and not into the air.*

2½% Basudin Dust

This is applied at the rate of 2-4 ozs. per 1,000 cubic feet of air space and, here again, the efficiency depends on the efficiency of the powder distributor in use. The same conditions in the house prior to treatment should be arranged and, after dusting, the use of a fan to increase the distribution should always be arranged.

The dust lends itself to a somewhat wider application than the aerosol in that the compost itself can be treated. If peak heating is effectively carried out the compost is pest free when it has cooled down for spawning. Entry of all types of Mushroom Flies and Midges can readily occur at, or immediately subsequent to spawning. It is therefore common sense either to protect the compost by the addition of a stable insecticide at filling, or to ruffle in insecticide to the compost just prior to spawning. 2½% Basudin Dust has been tested out under commercial growing conditions for nearly two years and has given very encouraging results. Added to the compost at the rate of 6 lb. per ton of manure it has been shown by chemical and biological tests to remain active and effective following 48 hours at peak heat conditions. Ruffled into the top 2" of the compost after peak heating and before spawning has given protection against fly egg-laying and infestation. In both cases there was no difference whatever between control and treated beds in the rate of spawn growth and the rate of production.

20% Emulsifiable Solution

This formulation must not be confused with the 20% Aerosol. The Emulsifiable Solution is made up in water at the rate of 16 fluid ozs. per 100 gallons of water and can be used for a variety of purposes such as spraying the outside of compost piles, spraying out empty houses, etc. It is *not recommended* for direct use on mushroom beds.

Basudin formulations are recommended against the following mushroom pests:—

Sciarid, Phorid, and Cecid flies; Springtails and Mites.

WHAT IS A NORMAL MUSHROOM?

By D. G. GANDY & P. B. FLEGG

Mushroom Grower : " I am getting funny looking mushrooms." **Inquiring Scientist:** " Oh yes! What are they like?" **M.G.:** "Well it's hard to say. They are dry, brown and, well, they don't look right." **I.S.:** " Long stems?" **M.G.:** " No, I wouldn't say that, but they do have small caps. We call them Belisha beacons (or lighthouses ! or drumsticks! or cigarettes!)" **I.S. :** " Sure the stems aren't long?" **M.G.:** "I don't think so, at least, well, to tell the truth I'm not sure. The most noticeable thing is the small cap which is sort of round and slimy and . . . . . and . . . . . " **I.S.:** (thinks) " Clear as mud." **M.G.:** " and . . . and . . . well let's go and see if we can find one."

How often we have taken part in this type of conversation! It is bad enough when this happens on a mushroom farm and the specimen is forthcoming, but when there is only a grower's description to go on, is it any wonder that we cannot get a clear mental picture of the mushrooms in question? With the advent of " La France " and similar troubles, matters have become much worse and in desperation we have sought a standard method of describing these deformities. Obviously, before describing abnormal mushrooms we had first to define a " normal " mushroom.

At the recent International Conference we published the results of our work on this problem to date and here will only briefly refer to them. We measured several hundred mushrooms from varying sources and found certain definite relationships between such dimensions as cap and stem diameter, cap diameter and height and cap diameter and total weight. While most of the mushrooms which we judged to be " normal " agreed very well with these relationships, those which were described as " stemmy " or " leggy " differed considerably from the majority relationship. We also found that a few mushrooms described as abnormal by a grower had similar proportions to the several hundred which we had gathered, i.e., they were in fact *not* abnormal according to our classification. Obviously judgment by eye is misleading and may lead to erroneous conclusions.

The first relationship we investigated was that of cap diameter and stem diameter (c : s ratio). Obviously this must vary according to stage of growth. At the early pinhead stage cap and stem are almost equal in diameter whilst the cap of a flat is five to six times wider than the stem. Mushrooms were accordingly divided into four categories: —

PINHEADS:	The earliest stage, cap and stem not always readily distinguishable, no veil visible.
BUTTONS:	Cap and stem readily distinguished, veil visible but unbroken.
CUPS:	Veil partly or completely broken, outer surface of cap still visible from directly underneath.
FLATS:	Cap extended to form a T with the stem, upper surface of cap not visible from below.

It was soon evident that at any one stage of growth the relationship between cap and stem diameter was fairly constant irrespective of the size of the mushroom. The respective c : s ratios are : —pinheads between 1 and 2 to 1, buttons between 2 and 3 to 1, cups between 3 and 4 to 1 and flats between 4 and 6 to 1. Mushrooms which fall outside these limits can, in our opinion, be considered abnormal. We have in fact, so far, met very few mushrooms which are abnormal in this respect and those which have been found take the form of a thickening of the

stem. No cases of abnormally thin stems have been found though without actual measurement one can be deceived by mushrooms with abnormally long stems which make the stem appear thin.

This brings us to what appears to be the most common type of abnormality, mushrooms with long stems. The relationship between cap diameter and total height (c: h ratio) that is height measured before cutting off the end of the stalk, has been measured for many mushrooms. To obtain the height measurement the mushrooms are lifted from the bed and loose casing compost and mycelium gently rubbed away with the fingers. The mushroom is then sliced vertically down the centre and distance from the top of the cap to base of the stem measured with a ruler.

We found that the mean c : h ratio is about 0.9 : 1 that is the height of the average mushroom is slightly greater than the diameter of the cap. For practical purposes this ratio can be said to hold irrespective of stage of growth or size. There was considerable variation around this average relationship and we have proposed that for practical purposes a mushroom whose cap diameter is more than one and a half times and less than two-thirds of the height should be considered abnormal. Few examples of the former type of abnormality have so far been found and indeed if found would not be complained of by many growers. The mushrooms would have short stalks compared with the cap diameter and there would be less wastage of stalk tissue in picking. Perhaps this is the type of mushroom we should aim to grow? Of the second type of abnormality in which the stem is very long we and many growers have seen numerous examples. However, it is necessary to be able to measure and describe the degree of abnormality.

The relationship between cap diameter and weight is also an interesting one but so far we have found few mushrooms which diverge from the normal relationship. We would be most interested to receive information on mushrooms which appear to be either light and pithy or heavy and waterlogged.

As a result of our measurements we have been able to put forward numerical limits of normality. Now we should like some information from growers. Let us know if your ideas of a normal mushroom differ radically from ours. Above all we should like more measurements. The more information we have the more accurate we can make our classification and then perhaps we will hear no more of Eiffel Towers, drainpipes and the like.

HOW YOU CAN HELP US

What are the measurements of your idea of a normal mushroom at the button, cup and flat stage of growth? Select a button, cup and flat which you consider normal and send us the following measurements of each one.

Cap diameter: Stem diameter: Total height: Weight.

Measurements are also needed of abnormal mushrooms, especially those which are waterlogged or dry and pithy, as well as any others with the common abnormalities described. Please exclude mushrooms which have any of the known diseases such as mycogone, bacterial pit, verticillium, etc.

An illustration of an abnormal mushroom will appear in our next issue.—Editor.

MGA SCORES DISTINCT SUCCESS . . . . at the WOMEN'S PRESS CLUB

The " Mushroom Feast " at the Women's Press Club, Carey Street, London, on Wednesday, 30th May, was an outstanding success with some 200 or more women journalists, representing a large number of publications, attending.

The club premises all three floors—were crowded with some guests overspilling on to the pavement outside.

Interest was lent to the occasion by the fact that club members, including cookery experts who are household names throughout the British Isles, themselves provided more than twenty mushroom recipes from which the various dishes were supplied.

MGA Committee members, with Raymond Thompson in the foreground and behind him Capt. E. A. Gook, and Capt. G. P. Lawrence and Guy Reed in the background, chatting to women journalists.

Mushrooms for the "feast" were provided by the Mushroom Growers' Association, the chairman of which, Mr. G. W. Baker, with Mrs. Baker, was present. So too, in addition to the journalists and their guests, were members of the MGA Executive Committee and Publicity Sub-Committee, together with their wives.

On show were some trays of growing mushrooms, whilst ranged round one wall of the main reception room were attractive ½ lb. mushroom pre-packs. Each guest before leaving was presented with one of these pre-packs.

Members of the MGA circulated amongst the guests and answered many questions on mushroom growing in general.

During the evening Mrs. Lawrence, wife of Capt. G. P. Lawrence, past MGA Chairman, made a short but amusing speech extolling the virtues of mushrooms in general. She was introduced by Ellen Drury, President of the Women's Press Club who said how grateful club members were for the hospitality of the Mushroom Growers' Association for providing such a great opportunity for sampling the delights offered by cultivated mushrooms.

MGA Vice-Chairman, G. V. Allen, who comes from Bilting, Kent, found a charming companion in Jean Bartlett (Northcliffe Newspapers) and between them discovered they were near neighbours, as Miss Barlett's home is at Ashford.

In the course of a delightful speech Mrs. Lawrence said she was a little overwhelmed at being asked to speak before such a distinguished gathering. She hoped that a scientific lecture was not expected, for she was neither scientist nor grower; rather she was that lowest form of life, a grower's wife (laughter).

Mrs. Lawrence continued: "The first thing to remember is that all mushrooms are feminine. In fact the whole job is rather like married life, with the husband the grower and the wife the crop. He moves heaven and earth to get all the conditions right and if he's clever at it and lucky, the mushrooms grow prolifically. Then suddenly they change for no reason he can see. He is plunged into despair; but does he give up growing? No—partly because it is his job and also because, like all feminine things, mushrooms are erratic, unpredictable and infuriating. But they are also delicious and fascinating."

Mrs. Lawrence went on to outline the various ways in which mushrooms could be prepared for the table, adding, "As Philip Harben has said, 'They transform a homely dish into a banquet fare.'" One might almost call them an all-purpose food. Certainly, as she herself had found, they were a useful weapon in the hands of a "blackmailing wife" (laughter).

Later in her talk, Mrs. Lawrence made the point that cultivated mushrooms need not be peeled and she protested against the often held opinion that mushrooms were dear and a luxury. "When you think what a long way a quarter or half pound of mushrooms will go you cannot really call them expensive," she said, adding, "To every cook they are a necessity, not only for their excellent flavour, but for their great nutritive value and high vitamin content. This fact was borne out by the knowledge that, during the war, mushrooms were part of the diet of the U-Boat crews. Fugitives, hiding in the woods, were literally kept alive by mushrooms they found."

Referring to the fact that the gathering was at a ladies' club, Mrs. Lawrence pointed out that mushrooms were also said to be good for slimming and for the complexion, adding, "Don't look at me, I don't think I've eaten enough of them lately" (laughter). Mrs. Lawrence then

gave a brief history of the mushroom industry, said mushrooms were a prized delicacy of the ancient Greeks, Romans and Egyptians, and added that they had been grown in France for about 300 years. About 100 years ago the industry gained a footing in England and great strides had been made in the last 25 to 30 years.

Finally, Mrs. Lawrence spoke of the formation and growth of the MGA and urged everyone writing about mushrooms to seek such information as they required from the MGA Office at 45 Bedford Square, London, W.C.1. Finally, in expressing thanks to the officers of the club, Mrs. Lawrence spoke of the respect and admiration she held for the power of the Press.

A picture of fresh, youthful beauty as she emerged from the doors of the club. No! the pre-packs were not all for herself.

As others see us . . .

M-M-M MUSHROOMS

That lively organisation the Mushroom Growers' Association has done it again. Last week it organised a publicity venture directed at women journalists with success that I can only describe as staggering.

The Association invited women writers to attend a Mushroom feast at the Women's Press Club in London and when I arrived there were so many there that they had bulged out on to the pavement. Recipes for the various Mushroom dishes that were served had been invented by members of the Press Club and delicious they were. Mushroom growers were there, too, to explain the finer points of growing, there were demonstration trays and a pre-pack of Mushrooms for everybody.

And these are the ladies who write in the mass-circulation women's magazines and contribute the cookery notes to National and Provincial newspapers. Some of their names are household words and there is no doubt that they can and do influence the eating habits of thousands of homes throughout the country.

Mushroom growers are fortunate in having an organisation that is so active on their behalf. Producers of other horticultural commodities may well look a little wistfully at their success. —" **Wayfarer.**"

Nurseryman & Seedsman.

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STEROLE 'M'

Especially for mushroom growers

This high grade emulsified coal tar antiseptic formulation is especially recommended for mushroom farm hygiene

40 GALLON DRUMS - - - £12 · 17 · 6

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MEETING OF GROWER MEMBERS IN THE BATH & BRISTOL AREA

A meeting of Grower Members in the Bath and Bristol area was held at the Lansdown Grove Hotel, Bath, on 28th May, to discuss local problems connected with mushroom growing, and to inaugurate a Committee to establish a South Western Area Section of the Association.

The chair was taken by Mr. A. G. Pointing. He expressed his appreciation of the presence of Mr. G. W. Baker, the MGA Chairman, who told the meeting of his keen interest in the formation of area activities to strengthen the Association as a whole. The question of an area having a representative on the General Committee was discussed, and it was agreed that this would be a great advantage, as it would enable area members to express their views to the General Committee through such a representative.

Mr. Graham Griffiths (Wrington Vale Nurseries) raised the question of the lack of facilities for dealing with growers' problems since the closing down of the MRA. He stated that he had been troubled with crop losses through disease and, whilst the NAAS representative had been most helpful in his attitude, due to the lack of a Research Station nothing had been done in the matter of finding a practical solution to the problem. He said that he understood that when the new Horticultural Research Station was completed its activities as far as Mushroom Growers were concerned would be confined to fundamental research. Those present fully agreed with Mr. Griffiths that this limitation of activities was extremely unsatisfactory.

Following a further discussion it was decided that Mr. Griffiths and Mr. A. G. Pointing should interview the Chief Horticultural Adviser for the area, and express to him personally the views of the meeting.

The meeting considered it was desirable that a proper area for the South West should be designated by the General Committee, and that meetings should be held three times a year, with at least one Farm Walk per annum.

Those present were Mr. G. W. Baker, Chairman of the MGA Executive Committee; E. J. Bateman, G. Griffiths, J. D. Rowley, S. J. Pointing, I. Pointing, and A. G. Pointing.

LAST MONTH'S PUBLICITY CONTRIBUTIONS

	£	s.	d.
Broome & Green (London) Ltd., Salesmen, 27 James Street, Covent Garden, W.C.1	105	0	0
The Cowling Group, Salesmen, Kirkgate Market, Leeds	10	0	0
Dr. Rempe, Essen-Bredeney, Germany	1	13	8

MGA PUBLICITY SCHEME

Both the Executive Committee and the Publicity Sub-Committee acknowledge with pleasure the following contributions to the Publicity Fund. All concerned on the MGA side of this effort are gratified at the fact that, in the case of many contributors, it is an expression of renewed support and confidence in the efforts being made by the Association to further publicise the cultivated mushroom.

	£	s.	d.
Wm. Artindale & Son Ltd., Salesmen, Castlefolds Market, Sheffield ..	18	9	0
A. Phippen (Brentford) Ltd., Salesmen, Brentford	5	0	0
H. G. Walker Ltd., Salesmen, Covent Garden Market, W.C.2	10	10	0
Shirley Organics Ltd., Activators, Battersea, London, S.W.11	25	0	0
G. E. Leatherland Ltd., Salesmen, Newcastle-on-Tyne	57	6	0
T. J. Poupart Ltd., Salesmen, Covent Garden, W.C.2	100	0	0
Francis Nicholls Ltd., Salesmen, Smithfield Market, Birmingham ..	157	10	0
Marks & Co. Ltd., Salesmen, Covent Garden Market, W.C.2	2	2	0
Geo. Jackson & Co. Ltd., Salesmen, Smithfield Market, Birmingham ..	5	5	0
Thomas Elliott Ltd, Sundries, New Church Road, London, S.E.5 ..	10	10	0
C. H. Deakin Ltd., Salesmen, Smithfield Market, Manchester	10	10	0
H. Dowson & Co. Ltd., Salesmen, Newcastle-on-Tyne	1	1	0
J. W. Laws Ltd., Salesmen, Newcastle-on-Tyne	2	0	0
Dan Wuille & Co. Ltd., Salesmen, Covent Garden Market, W.C.2 ..	50	0	0
J. Collingridge & Co. Ltd., Salesmen, Covent Garden Market, W.C.2..	25	0	0
R. E. Jenkinson Ltd., Salesmen, Covent Garden Market, W.C.2 ..	105	0	0
Ed. H. Lewis & Sons Ltd., Salesmen, Covent Garden Market, W.C.2	5	5	0
P. C. Brown, Biddulph, Stoke-on-Trent	8	6	8
J. N. Proctor, Minskip, York	5	16	0
R. J. McBriar, Overdale, Saintfield, Belfast	5	5	0
N. Olverson, Scarisbrick, Nr. Ormskirk, Lancs.	5	0	0
Stable Manures Ltd., Newmarket and Worthing	30	15	9
J. Jones & Sons, Salesmen, North Market, Liverpool	3	3	0
C. Snowdon & Co. Ltd., Salesmen, Castlefolds Market, Sheffield ..	10	11	7
*W. Darlington & Sons Ltd., Spawn Merchants, Worthing			
*Farmers & Growers Industries Ltd., Spawn Merchants, Worthing			
*Geo. Monro Ltd., Spawn Merchants, Waltham Cross			
*H. Mount & Sons Ltd., Spawn Merchants, Littlebourne, Canterbury			
*J. E. R. Simons Ltd., Spawn Merchants, Harlow, Essex			
*S. A. F. Sampson Ltd., Spawn Merchant, Oving, Chichester			
Somers & Gibson Ltd., Salesmen, Smithfield Market, Mancheseter 4 ..	26	5	0
Reuben Levy Ltd., Salesmen, Spitalfields Market, London, E.1	3	1	2
Walter Lund Ltd., Salesmen, Kirkgate Market, Leeds	5	0	0
Langford Nursery, Clymping, Littlehampton, Sussex	2	12	6

*The amounts collected by Spawn Merchants are not for publication

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AIR-CONDITIONED DUTCH HOUSES

By E. de KLEERMAEKER

In 1950, three modern mushroom houses* were built at Mook (Holland) along lines suggested by Dr. and Mrs. P. J. Bels and in co-operation with the Institute for Horticultural Engineering at Wageningen. They each contain shelf beds in two tiers of five.

*(They were experimental in purpose, and yet had the merit of being commercial in operation ; and the experiments continue.—*Editor.*)

The temperature both for peak heating and subsequently is obtained by drawing air from a hot-air stove and blowing it through a duct in the ceiling. Circulation is obtained by extracting the air through a channel in the floor along each side wall, or dispersed outside. (*See Figure* 1). There is provision for partial re-circulation and the introduction of a proportion of fresh air.

One difficulty which has been encountered is that warm dry air passing over the top beds with some rapidity causes them to dry out quickly. The fast-moving air tends to bounce back from the side walls, too, and the surface of the next shelf also tends to dry out, especially the sides against the walls.

The degree of drying-out can be reduced by increasing the interval between the ceiling duct and the top shelves, but the growers do not like to lose growing area.

This is a point which will be borne in mind when further houses come to be built. Trials in some of the Mook houses suggest that it might be better after peak heat to blow the warmed air upwards from the side wall channels (in the case of shelves: *Figure* 2) or from channels along the two aisles (in the case of trays: *Figures 3a and 3b*). Care would have to be taken not to place the trays in actual contact with the walls, because with high Relative Humidity (85—94%) some condensation is inevitable.

A further development may be along the lines revealed in *Figure* 4. An incidental point to be noted is that in summer the hot air is inclined to linger in the upper half of the house. It has been found possible to overcome this by opening a vent in the end walls just below ceiling level.

It will probably be necessary to insulate the floor channels to minimise heat losses. It has already been found that, because of these losses, it is more expensive to heat the house from the floor channels than from the ceiling duct.

In the next experiments the supply and removal of air will take place through a channel about 32 inches deep along the centre aisle in which will rest two circular ducts (14 inches diameter) one above the other. The air will come in through the lower tube and be extracted through the upper one.

It is not known whether this method will give satisfaction in practice; there may be difficulty in keeping the lower duct clean, for example. Although the mouths of the ducts will be covered by gratings, eventually some compost and casing material is certain to get in, apart from water, and moulds and bacteria will appear.

For an experimental period one hot-air stove will be used for each growing room, because if the air from several houses is re-circulated any disease spores present in one room could be introduced to others. One central stove would of course be more economical and the danger mentioned could be overcome. In this case an oil-burning unit would save more labour still.

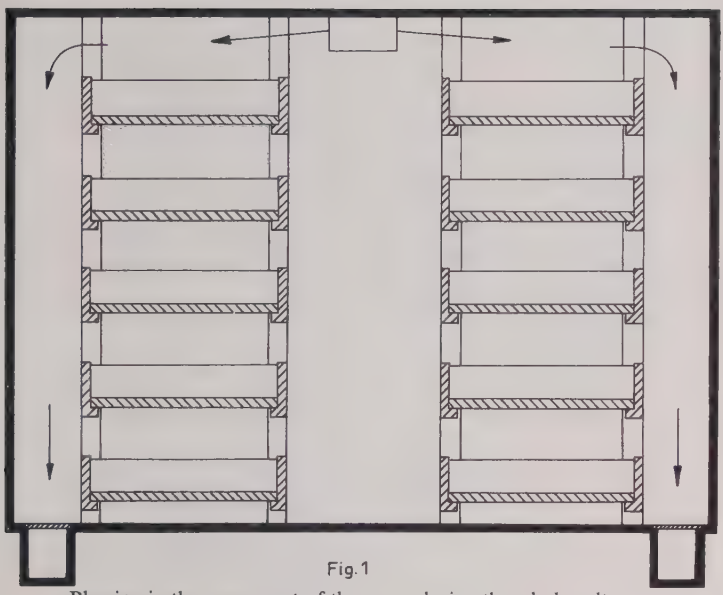

Fig. 1

Blowing in the upper part of the room during the whole culture.

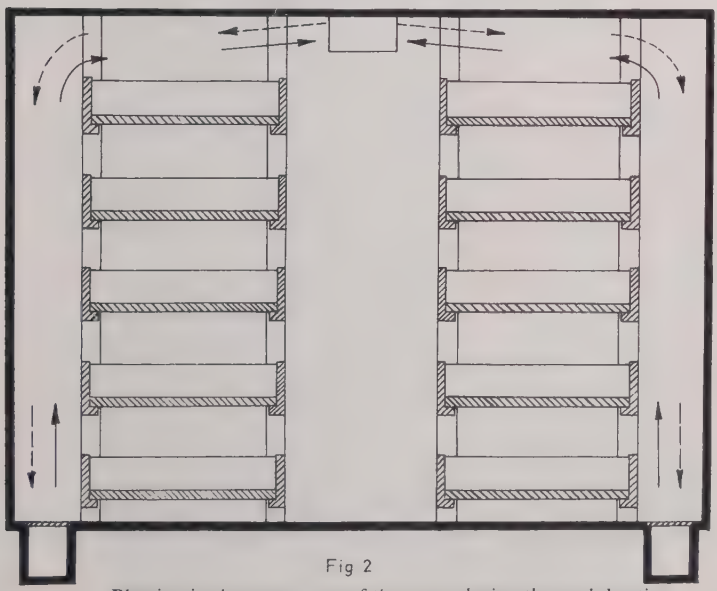

Fig 2

- - - - - Blowing in the upper part of the room during the peak heating

——— Blowing in the lower part of the room during the further culture

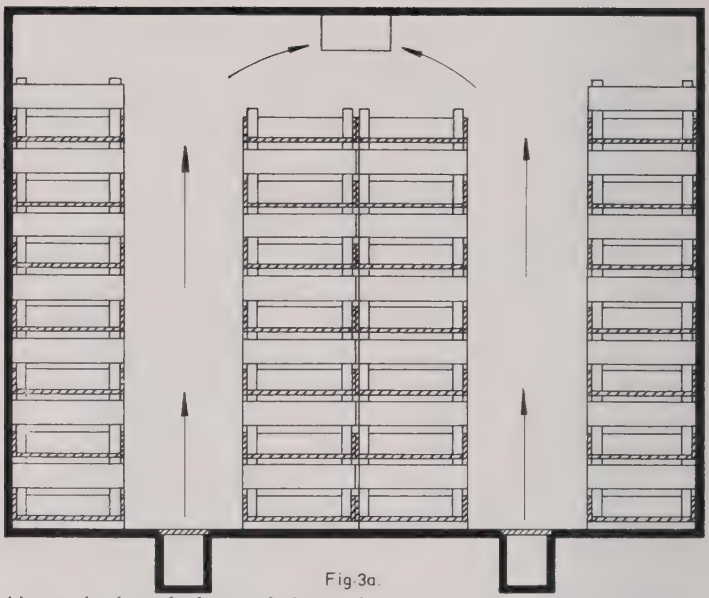

Fig.3a.

Air supply through the canals in the floor
Removal of air through the tube along the ceiling

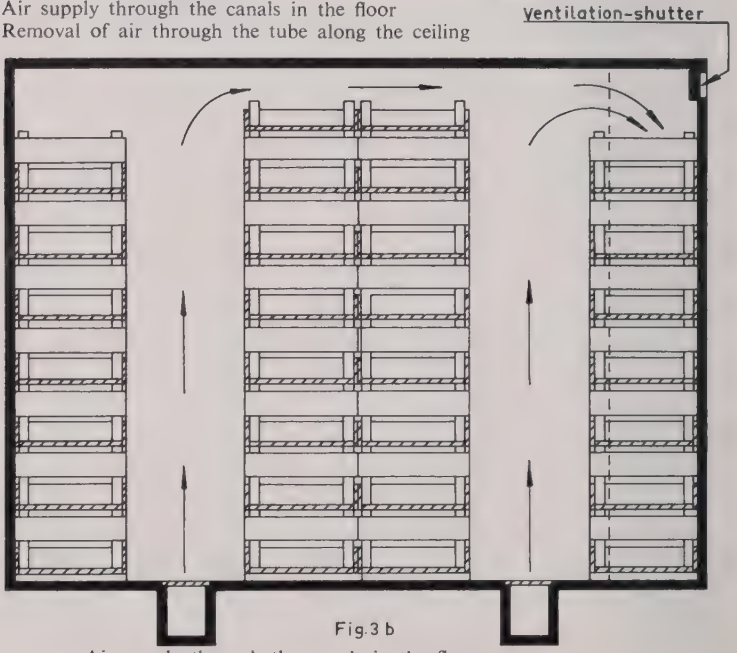

Fig.3 b

Air supply through the canals in the floor
Removal of air through a vertical tube along the side-wall

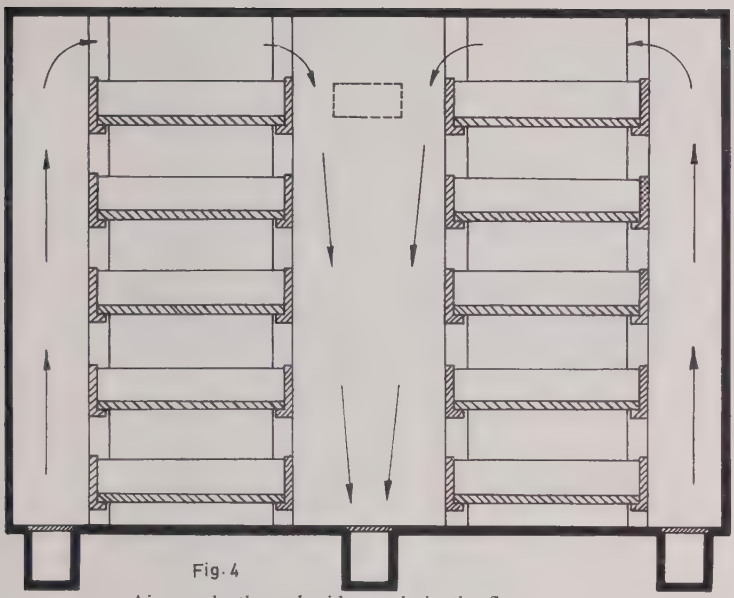

Fig. 4

Air supply through side-canals in the floor
Removal of air through middle canal in the floor
Shutter for the removal of hot air after peak-heating

MUSHROOM INDUSTRY

5th ANNUAL

EXHIBITION

at the

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EASTBOURNE

WEDNESDAY & THURSDAY
14th & 15th NOVEMBER
1956

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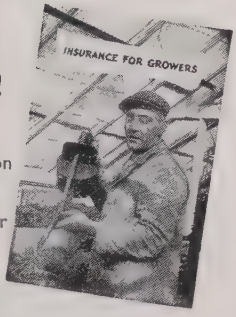

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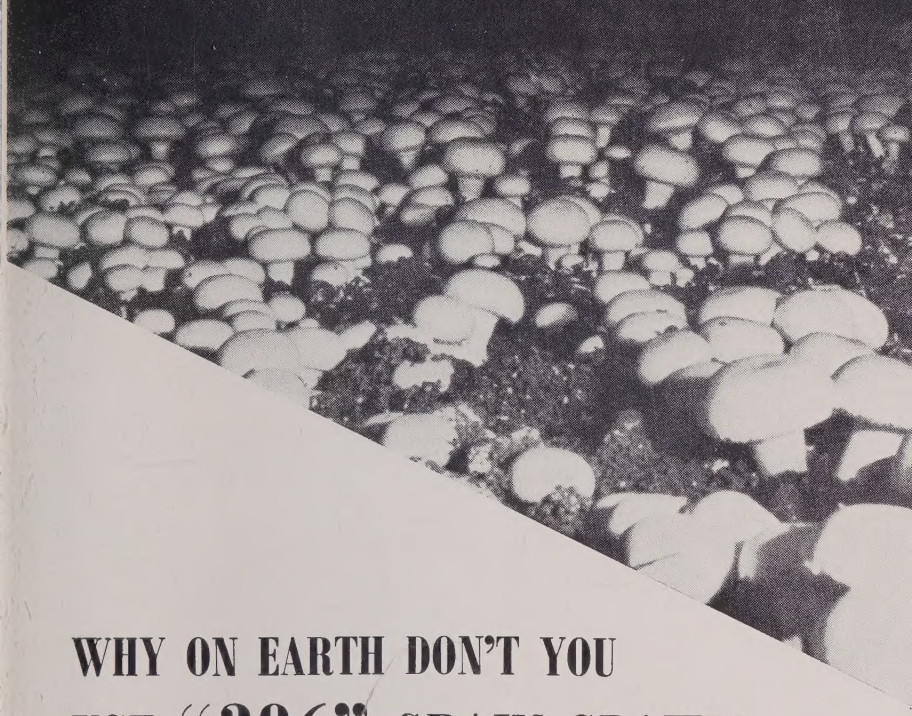
THIRD INTERNATIONAL CONFERENCE—*Continued from page 214*

his duties with not too gay abandon. Notable absentee from this event was Mr. Rasmussen, who had to be hurried back to Sweden suffering from internal trouble.

In due course the papers in full will be published as Mushroom Science 3 and, finally, it is hoped that the next conference will be at Copenhagen in 1959. W.R.A.



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